

Claims

1. A perforating gun for perforating a well, comprising:

a plurality of charge containers for containing charges to be detonated to perforate the well;

an elongate carrier strip having a centerline along its length and a transverse axis along its

10 width, the carrier strip defining longitudinally extending, laterally opposing edges;

a plurality of charge container mounting holes in the carrier strip, each charge container supported on the carrier strip through substantially continuous contact between an outer surface of the charge container and an inner surface of the mounting hole;

15 a pair of webs each defined between a respective mounting hole and a respective adjacent edge of the carrier strip, each web having a web width between the mounting hole and respective adjacent edge; and

a relief hole positioned longitudinally adjacent each mounting hole, with a longitudinal spacing between a perimeter of the relief hole and a perimeter of the mounting hole less than each web width, such that the charge container has less resistance to outward yielding at a 20 location adjacent the relief hole than at locations adjacent the webs during a substantially uniform radially outward loading of the detonating charge container against the mounting hole.

2. A perforating gun as defined in Claim 1, wherein the relief hole is longitudinally

spaced from the mounting hole by a deformable relief section bridging the mounting hole and the

5 relief hole for yielding generally toward the relief hole in response to detonation of the charge
container.

10 3. A perforating gun as defined in Claim 2, wherein the longitudinal spacing
between the perimeter of each relief hole and a perimeter of each respective mounting hole is less
than 50% of either web width.

15 4. A perforating gun as defined in Claim 1, further comprising:
a threaded connection between each mounting hole and respective charge container, for
removably supporting each charge container on the carrier strip.

20 5. A perforating gun as defined in Claim 1, further comprising:
another relief hole longitudinally opposite the relief hole with respect to the mounting
hole.

6. A perforating gun as defined in Claim 1, wherein the carrier strip has a
substantially uniform width between the opposing edges of the carrier strip extending
longitudinally between the plurality of mounting holes.

7. A perforating gun as defined in Claim 1, further comprising:

5 each relief hole is generally circular and has a diameter greater than 50% of a diameter of
the respective mounting hole.

10 8. A perforating gun as defined in Claim 1, wherein the relief hole is an elongate slot
extending longitudinally with respect to the respective mounting hole.

15 9. A perforating gun as defined in Claim 1, further comprising:
a plurality of relief holes longitudinally arranged to one side of a respective mounting
hole with a longitudinal spacing between the perimeter of any two relief holes being less than
25% of either web width.

20 10. A perforating gun as defined in Claim 1, wherein the relief hole intersects the
mounting hole, such that the outer surface of the charge container is substantially unsupported by
the mounting hole at the intersection.

25 11. A perforating gun for perforating a well, comprising:
a plurality of charge containers for containing charges to be detonated to perforate the
well;
an elongate carrier strip having a centerline along its length and a transverse axis along its
width, the carrier strip defining longitudinally extending, laterally opposing edges;

5 a plurality of charge container mounting holes in the carrier strip, each charge container supported on the carrier strip by a threaded connection between an outer surface of the charge container and an inner surface of the mounting hole;

10 a pair of webs each defined between a respective mounting hole and a respective adjacent edge of the carrier strip, each web having a web width between the mounting hole and respective adjacent edge; and

15 at least two relief holes longitudinally opposite one another with respect to the mounting hole, each relief hole having a perimeter longitudinally spaced from the mounting hole less than 50% of either web width, such that the charge container has less yielding resistance at locations adjacent the relief holes than at locations adjacent the webs during a substantially uniform radially outward loading of the detonating charge container against the mounting hole.

20 12. A perforating gun as defined in Claim 11, wherein each relief hole is longitudinally spaced from the mounting hole by a deformable relief section bridging the mounting hole and the relief hole for yielding generally toward the relief hole in response to detonation of the charge container.

24 13. A perforating gun as defined in Claim 11, wherein the carrier strip has a substantially uniform width between the opposing edges of the carrier strip extending longitudinally between the plurality of mounting holes.

14. A perforating gun as defined in Claim 11, further comprising:
each relief hole is generally circular and has a diameter greater than 50% of a diameter of
the respective mounting hole.

10 15. A perforating gun as defined in Claim 11, wherein at least one relief hole is an
elongate slot extending longitudinally with respect to the respective mounting hole.

15 16. A perforating gun as defined in Claim 11, further comprising:
one or more additional relief holes longitudinally arranged with respect to at least one of
the relief holes with a longitudinal spacing between the perimeter of any two longitudinally
spaced relief holes being less than 25% of either web width.

20 17. A perforating gun as defined in Claim 11, wherein one or more relief holes
intersect the mounting hole, such that the outer surface of the charge container is substantially
unsupported by the mounting hole at the intersection.

18. A perforating gun for perforating a well, comprising:
a plurality of charge containers for containing charges to be detonated to perforate the
well;

5 an elongate carrier strip having a centerline along its length and defining longitudinally
extending, laterally opposing edges;

a plurality of charge container mounting holes in the carrier strip, each charge container supported on the carrier strip through substantially continuous contact between an outer surface of the charge container and an inner surface of the mounting hole;

10 a pair of webs each defined between a respective mounting hole and a respective adjacent edge of the carrier strip, each web having a web width between the mounting hole and respective adjacent edge; and

15 a generally circular relief hole having a diameter greater than 50% of a diameter of a respective mounting hole, the relief hole having a perimeter longitudinally spaced with respect to a perimeter of the respective mounting hole less than 50% of either web width to define a deformable relief section bridging the mounting hole and the relief hole for yielding generally toward the relief hole in response to detonation of the charge container, such that the charge container has less yielding resistance at locations adjacent the relief section than at locations adjacent the webs during a substantially uniform radially outward loading of the detonating charge container against the mounting hole.

20 19. A perforating gun as defined in Claim 18, further comprising:

a threaded connection between each mounting hole and respective charge container, for removably supporting each charge container on the carrier strip.

5 20. A perforating gun as defined in Claim 18, further comprising:

another relief hole longitudinally opposite the relief hole with respect to the mounting
hole.

10 21. A perforating gun as defined in Claim 18, wherein the carrier strip has a

substantially uniform width between the opposing edges of the carrier strip extending
longitudinally between the plurality of mounting holes.

15 22. A perforating gun as defined in Claim 18, further comprising:

a plurality of relief holes longitudinally arranged to one side of a respective mounting
hole with a longitudinal spacing between the perimeter of any two adjacent relief holes being less
than 25% of either web width.

20 23. A perforating gun for perforating a well, comprising:

a plurality of charge containers for containing charges to be detonated to perforate the
well;

an elongate carrier strip having mounting locations for supporting charge container
brackets, each bracket defining longitudinally extending, laterally opposing edges;
a charge container mounting hole in each bracket for supporting a charge container
through substantially continuous contact between an outer surface of the charge container and an

- 5 inner surface of the mounting hole;
 a pair of webs each defined between a respective mounting hole and a respective adjacent edge of the bracket, each web having a web width between the mounting hole and respective adjacent edge; and
 a relief hole positioned in each bracket longitudinally adjacent each mounting hole, with a
10 longitudinal spacing between a perimeter of the relief hole and a perimeter of the mounting hole less than each web width, such that the charge container has less resistance to outward yielding at a location adjacent the relief hole than at locations adjacent the webs during a substantially uniform radially outward loading of the detonating charge container against the mounting hole.
- 15 24. A perforating gun as defined in Claim 23, wherein the relief hole is longitudinally spaced from the mounting hole by a deformable relief section bridging the mounting hole and the relief hole for yielding generally toward the relief hole in response to detonation of the charge container.
- 20 25. A perforating gun as defined in Claim 23, wherein the longitudinal spacing between the perimeter of each relief hole and a perimeter of each respective mounting hole is less than 50% of either web width.
26. A perforating gun as defined in Claim 23, further comprising:

5 a threaded connection between each mounting hole and respective charge container, for
removably supporting each charge container on the carrier strip.

27. A perforating gun as defined in Claim 23, further comprising:
another relief hole longitudinally opposite the relief hole with respect to the mounting
10 hole.

28. A perforating gun as defined in Claim 23, further comprising:
each relief hole is generally circular and has a diameter greater than 50% of a diameter of
the respective mounting hole.

15 29. A perforating gun as defined in Claim 23, wherein the relief hole is an elongate
slot extending longitudinally with respect to the respective mounting hole.

20 30. A perforating gun as defined in Claim 23, wherein the relief hole intersects the
mounting hole, such that the outer surface of the charge container is substantially unsupported by
the mounting hole at the intersection.